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IS 14231-5 (1995): Cabled Distribution System for Television and Sound Signals, Part 5: Headend [LITD 7: Audio, Video and Multimedia Systems and Equipment]

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टेलीविजन और ध्वनि संकेतों के लिए केबलकृत वितरण तंत्र

भाग 5 हैडएंड

Indian Standard

CABLED DISTRIBUTION SYSTEM FOR TELEVISION AND SOUND SIGNALS — SPECIFICATION

PART 5 HEADEND

UDC 621·396·621·2 : 621·397·743

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

July 1995

Price Group 9

Radio Communications Sectional Committee, LTD 20

FOREWORD

This Indian Standard (Part 5) was adopted by the Bureau of Indian Standards, after the draft finalized by the Radio Communications Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

The series of standards on cabled distribution system for television and sound signals comprises the following parts:

Part 1 Safety requirements
Part 2 Electromagnetic compatibility for system and components (*under preparation*)
Part 3 Active coaxial wideband distribution components
Part 4 Passive coaxial wideband distribution components
Part 5 Headend

This standard (Part 5) describes the characteristics and minimum requirements of the equipments used in the headends of terrestrial broadcast and satellite receiving systems.

This standard is largely based on IEC document 12G (Sectt) 131 'Cabled distribution system for television and sound signals : Part 5 Headend'.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

CABLED DISTRIBUTION SYSTEM FOR TELEVISION AND SOUND SIGNALS — SPECIFICATION

PART 5 HEADEND

1 SCOPE

1.1 This standard (Part 5) covers characteristics of the equipment used in the headends of terrestrial broadcast and satellite receiving systems (without satellite outdoor units). The standard contains the minimum requirements to be met, data sheets which have to be published and test specifications necessary for special measurements.

1.2 This standard only deals with the interfaces between headend components and explains the function of the devices if this is necessary to support the description of the interfaces.

1.3 This standard does not cover coder, transcoder, encrypter, decrypter, etc. If such devices are used in headends, the relevant parameters for RF, video, audio and data interfaces have to be met accordingly.

2 REFERENCES

2.1 The Indian Standards listed in Annex Q are necessary adjuncts to this standard.

3 DEFINITIONS

3.1 For the purpose of this standard, following terms and definitions shall apply.

3.1.1 *Headend*

Equipment which is connected between receiving antennas or other signal sources and the remainder of the cabled distribution system to process the signals to be distributed.

NOTES

1 An example of headend is given in Fig. 1.

2 The headend may, for example, comprise antenna amplifiers, frequency converters, combiners, separators and generators.

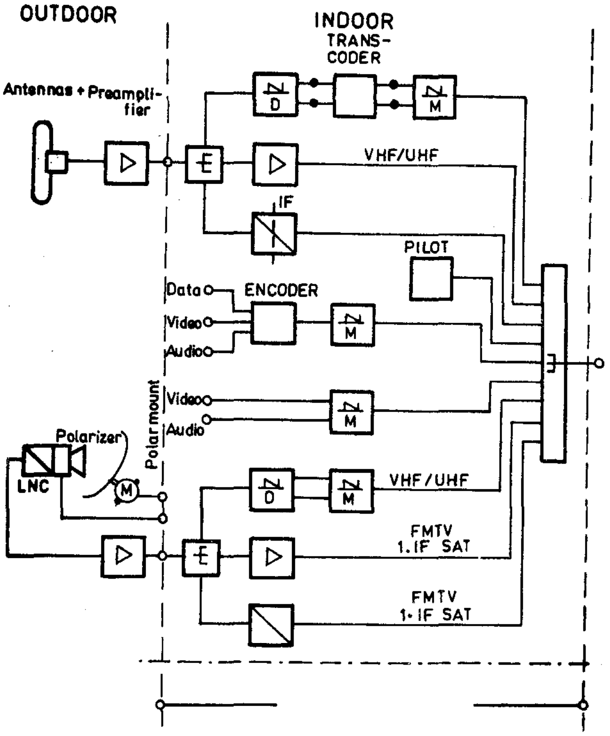


FIG. 1 EXAMPLE OF HEADEND

3.1.2 *Local Headend*

A headend which is directly connected to the system trunk feeders or to a short haul 'trunk feeder replacement' link.

3.1.3 *Remote Headend*

A headend from which signals are delivered to a local headend via a long-distance terrestrial or satellite link.

3.1.4 *MATV Headend*

MATV headends are used in blocks of flats and in built-up sites to feed customized TV channels into the house network or the spur network.

3.1.5 *Headend for Individual Reception*

A headend supplying a single subscriber. The system of this type may include one or more antenna outlets.

3.1.6 *Antenna Amplifier*

An amplifier (often a low noise type) associated with an antenna.

3.1.7 *Frequency Converter*

A device for changing the carrier frequency of one or more signals prior to transmission on a feeder.

3.1.8 *Combiner*

A device in which the signals arriving at two or more input ports are fed to a single output port.

NOTE — Some forms of this device may be used in the reverse direction as a splitter.

3.1.9 *Decibel Ratio*

The decibel ratio of two quantities of power P_1 and P_2 is defined by:

$$10 \log \frac{P_1}{P_2} \text{(dB)}$$

3.1.10 *Level*

The level of any power P_1 is the decibel ratio of that power to the standard reference power P_0, that is:

$$10 \log \frac{P_1}{P_0}$$

This may be expressed in decibels (relative to 1 µV in 75 Ω) or more simply in dB (µV) if there is no risk of ambiguity.

NOTE — By 'power' in relation to a vision-modulated carrier is meant power at the peak of the modulation envelope (that is, the maximum rms voltage squared and divided by the resistance).

3.1.11 *Attenuation*

The attenuation of any system is the decibel ratio of the input power to the output power.

3.1.12 *Gain*

The gain of any system is the decibel ratio of the output power to the input power.

3.1.13 *Automatic Gain Control (AGC)*

The automatic control of a device to maintain constant the level of the signal at its output, using the signal to be controlled as the control stimulus.

3.1.14 *Frequency Response*

The gain or loss of a system plotted against frequency.

3.1.15 *Intermodulation*

The process whereby non-linearity in equipment in a system produces spurious output signals (called intermodulation products) at frequencies which are linear combinations of those of the input signals.

3.1.16 *Carrier-to-Intermodulation Ratio*

The difference in decibels between the carrier level at a specified point in a system and the level of a specified intermodulation product or combination of products.

3.1.17 *Carrier-to-Noise Ratio*

The difference in decibels between the vision of sound carrier level at a given point in the system and the noise level at that point (measured within a bandwidth appropriate to the television or radio system in use).

3.1.18 *Well-Matched*

A test set-up is said to be 'well-matched' when the port or ports facing the equipment under test have a return loss ratio of at least 20 dB relative to the system impedance.

4 GRADES

4.1 According to the definitions in 3, the headends are classified into the following three quality levels:

Grade 1	Local headend/Hub headend
Grade 2	Remote headend
Grade 3	MATV headend/Individual reception headend

4.2 As practical experience has shown, these types meet all technical requirements necessary for supplying a minimum signal quality to the subscribers. This classification shall not be considered as a requirement but as an information for users and manufacturers on the minimum quality standards of the material required to install networks of different sizes. The system operator has to select the appropriate material or meeting the minimum signal quality at the subscriber's outlet.

5 PERFORMANCE REQUIREMENTS AND MEASURING METHODS

5.0 Measuring Methods

The detail description of the measuring procedures for determining the various parameters is given in the respective annexes.

5.1 Safety

The safety requirements of all components shall conform to IS 14231 (Part 1) : 1995, where applicable.

5.2 EMC

5.2.1 The limits of radiation and susceptibility to interference for all passive components covered by this standard are laid down in terms of their screening attenuation.

5.2.2 The screening attenuation shall conform to IS 14231 (Part 2) (*under preparation*).

5.3 Environmental

Manufacturers shall publish environmental information on their products to enable users to judge their suitability with regards to four main requirements; storage, transportation, installation and operation.

The presentation of the information shall conform with the requirements of the following publications.

5.3.1 *Storage* (simulated effects of)

IS 9001 (Part 14) : 1979

5.3.2 *Transportation*

Air freight (combined cold and low pressure)	IS 9000 (Part 31) : 1978
Road transport (bump test)	IS 9000 (Part 7/Sec 2) : 1979
Road transport (shock test)	IS 9000 (Part 7/Sec 1) : 1979

5.3.3 *Installation or Maintenance*

Drop and topple test	IS 9000 (Part 7/Sec 3) : 1979
Free fall test	IS 9000 (Part 7/Sec 4) : 1979

5.3.4 *Operation*

Climatic category of component or equipment for storage and operation as defined in following publications:

General	IS 9000 (Part 1) : 1988
Cold	IS 9000 (Part 2/Sec 1-4) : 1977
Dry heat	IS 9000 (Part 3/Sec 1-5) : 1977
Damp heat	IS 9000 (Part 5/Sec 1-2) : 1981
Vibration (sinusoidal)	IS 9000 (Part 8) : 1981

6 SIGNAL REQUIREMENTS

6.1 Indoor Unit

6.1.1 General requirements for power supply are 230 V -10% + 6%, 50Hz for Grade 1, Grade 2 and Grade 3.

6.1.2 RF parameters requirements for indoor unit are as given in Table 1.

6.1.3 Video parameters requirements are as given in Table 2.

6.1.4 Audio parameters requirements are as given in Table 3.

6.1.5 IF (AM-TV) : Requirements are as given in Table 4.

6.2 Outdoor

6.2.1 Requirements for antennas for terrestrial reception are as given in Table 5.

6.2.2 *Antenna Amplifier*

See the corresponding parameters of **6.1.2**.

7 DATA SHEETS REQUIREMENT

7.0 The guidance for drafting data sheets is given below.

7.1 The unit specifications shall be published on data sheets.

7.1.1 *General*

As to environmental conditions the data sheets shall at least contain the values according to **5.3.4**.

7.2 Indoor – TV (AM and FM)

7.2.1 *Maximum Admissible Output Voltage*

Specify the maximum admissible output voltage on the data sheets as well as on the devices themselves.

The values valid for the minimum carrier-to-interference ratios are as given in Table 6.

7.2.2 *Operating Range*

State minimum and maximum admissible output voltages in order to determine the operating range, if necessary.

7.2.3 *Kind of TV-Standard*

Specify on the data sheets the TV standard(s) which have been set up for the devices. (*See* Annex F for recommended selectivity diagram for adjacent channel transmission.)

7.2.4 *Clamp*

Specify on the data sheets which clamp suppression performance has been met. (Method of measurement: under consideration.)

7.2.5 *Noise Figure*

7.2.5.1 *Devices without AGC*

State the worst value at maximum gain in the specified range. This range is described in Annex E.

7.2.5.2 *Devices with AGC*

State the graph for noise in the specified operating range. Alternatively C/N or S/N may be stated (*see* Fig. 2).

7.2.6 *Data Signals, Description of Interface*

For data signals the following values shall be stated on the data sheets:

- Impedance
- Voltage
- Polarity
- Bit rate
- Protocol
- Connector

Table 1 RF Parameters Requirements

(*Clause* 6.1.2)

Sl No.	Parameters	Grade 1	Grade 2	Grade 3	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Impedance (input)	50 Ω or 75 Ω	75 Ω	75 Ω	
ii)	Impedance (output)	75 Ω	75 Ω	75 Ω	
iii)	Return loss (input, output) for components	≥18 dB	≥14 dB	≥10 dB	*See* Annex E
iv)	Return loss (output of headend)	Class B	Class B	≥10 dB	for class B, *see* IS 14231 (Part 3) : 1995
v)	Protection against other signals in the FM-TV range	—	—	—	*See* IS 14231 (Part 2) (*under preparation*)
vi)	Spurious signals in output, in AM-TV channels	≥60 dB	≥60 dB	≥60 dB	do
vii)	Spurious signals in output, in TV channel 40.........862 MHz	≥60 dB	≥60 dB	≥60 dB	*See* Annex D
viii)	Image rejection for AM-TV and FM radio	≥60 dB	≥60 dB	≥40 dB	
ix)	Local oscillator signal at the output. Distance to *Min.* operating level for AM-TV and FM radio	≥60 dB	≥60 dB	≥60 dB	
x)	Frequency instability for FM radio	±15 kHz	±15 kHz	±15 kHz	
xi)	Frequency instability for AM-TV without teletext	±75 kHz	±75 kHz	±75 kHz	
	AM-TV with teletext	±50 kHz	±50 kHz	±50 kHz	
xii)	Sound intercarrier (mono) if it is changed	±5 kHz (carrier)	±5 kHz	±15 kHz	
xiii)	Sound intercarrier (stereo/dual sound) if it is changed				The difference of the sound sub-carrier has to be maintained (precision half-line offset)
xiv)	Stability of residual carrier amplitude	$10^{+2.5}_{0}$%	10^{+10}_{0}%	10^{+10}_{0}%	
xv)	Output range for digital satellite radio signals	330 MHz/450 MHz/862MHz			
xvi)	Frequency stability FM-TV converter	± 200 kHz	± 200 kHz	± 200 kHz	
xvii)	Hum modulation				Value and method of measurement given in IS 14231 (Part 3) : 1995

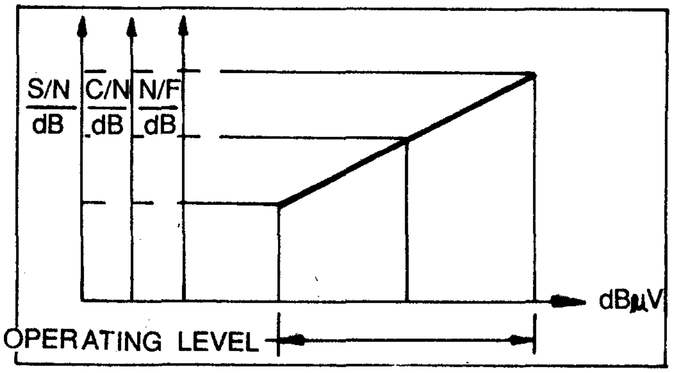


FIG. 2 EXAMPLE FOR DIAGRAM OF NF, C/N OR S/N FOR DEVICES WITH AGC

Table 2 Video Parameters Requirements

(*Clause* 6.1.3)

Sl No.	Parameters	Grade 1	Grade 2	Grade 3	Notes
(1)	(2)	(3)	(4)	(5)	(6)
i)	Impedance	75 Ω	75 Ω	75 Ω	BNC connector 50Ω is recommended [Doc : LTD 16 (1753)] (*under preparation*)
ii)	Return loss	≥34 dB	≥26 dB	≥26 dB	In nominal transmission range
iii)	Voltage	1 ± 0.1 Vpp	1 ± 0.1 Vpp	1 ± 0.3 Vpp	
iv)	Polarity	negative sync.	negative sync.	negative sync.	
v)	Offset voltage at 75 Ω load	≤2.75 V	≤2.75 V	≤2.75 V	

Table 3 Audio Parameters Requirements

(*Clause* 6.1.4)

Sl No.	Parameters	Grade 1	Grade 2	Grade 3	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Input impedance	≥600 Ω	≥600 Ω	≥600 Ω	*See* **7.2.16**
ii)	Output impedance	≤30 Ω	≤30 Ω	≤30 Ω	do
iii)	Voltage (AM-TV modulator) Standard B/G		1.55 V_{rms} for ±30 kHz deviation		Corresponds to +6 dBm at 600Ω load; f_m = 1 kHz, pre- and de-emphasis 50 µs
iv)	Voltage (FM radio modulator)		1.55 V_{rms} for ±40 kHz deviation		f_m = 1 kHz, pre- and de-emphasis 75µs

Table 4 IF (AM-TV) Requirements
(*Clause* 6.1.5)

Sl No.	Parameters	Grade 1	Grade 2	Grade 3	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Impedance	50 Ω or 75 Ω	75 Ω	75 Ω	75 Ω for all connectors [Doc : LTD 16 (1754) recommended] (*under preparation*)
ii)	Return loss	≥18 dB	≥14 dB	≥14 dB	

Table 5 Requirements for Antennas
(*Clause* 6.2.1)

Parameters	Grade 1	Grade 2	Grade 3	Remarks
Output impedance	50 Ω or 75 Ω	75 Ω	75 Ω	Recommended : 75 Ω for all. For H4 it is possible to also use 300 ohms balanced

Table 6 Carrier-to-Interference Ratio
(*Clause* 7.2.1)

Sl No.	Carrier-to-Interference Ratio	Grade 1	Grade 2	Grade 3	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	3rd order ratio for maximum output voltage channel amplifier	≥66 dB	≥54 dB	≥54 dB	*See* Annex A
ii)	3rd order ratio for maximum output voltage sub-band full band, multi-band amplifier and frequency converter				
	a) for AM-TV	≥80 dB	≥66 dB	≥66 dB	*See* Annex B
	b) for FM-Radio	≥60 dB	≥60 dB	≥60 dB	
iii)	2nd order ratio for maximum output voltage sub-band, full band, multi-band amplifier and frequency converter for AM-TV or FM radio	≥60 dB	≥60 dB	≥60 dB	Only for products being generated by signals in the range 87.5 to 108 MHz and falling in the ranges 175 to 230 MHz and 470 to 862 MHz. *See* Annex C
iv)	Ratio for maximum output voltage for FM-TV channel amplifier	≥35 dB	≥35 dB	≥35 dB	
v)	Ratio for maximum output level for FM-TV 3rd order full band, sub-band amplifier	≥35 dB	≥35 dB	≥35 dB	*See* Annex C

7.2.7 *Signal Level for TV Modulators, TV Converters and Pilot Generator*

State the signal levels for TV modulators, pilot generators and TV converters. It is recommended to meet the following values.

7.2.7.1 *TV modulator and TV converter*

In real operating conditions the variation of the output level shall be within ±0.5 dB for H0/H1, ±1.0 dB for H2, ± 1.5 dB for H3 and H4 during 6 months time compared to the initial value.

The TV converter shall be equipped with AGC, which keeps the output signal level within the given tolerance, when the input level varies 30 dB in the rated operating input level range 50......90 dB (μV).

7.2.7.2 *Pilot generator*

In real operating conditions the variation of the output level shall be within ±0.3 dB during 6 months time compared to the initial value.

NOTE — The following frequency ranges for the pilot frequencies are recommended:

A	47 - 120 MHz
B	230 - 420 MHz
C	430 - 450 MHz
D	550 - 606 MHz
E	750 - 862 MHz

7.2.8 *Differential Gain and Phase*

7.2.8.1 *Differential gain*

The values of differential gain for standard B/G are recommended as follows:

Grade 1	5%
Grade 2	8%
Grade 3	12%

For method of measurement (*see* Annex G).

7.2.8.2 *Differential phase*

The values of differential phase for standard B/G are recommended as follows:

Grade 1	3°
Grade 2	6°
Grade 3	10°

For method of measurement (*see* Annex G).

7.2.9 *Group Delay Variation*

7.2.9.1 The group delay variation is recommended as follows:

Standard B/G

for Grade 1 equipment from 0.1 to 4.43 MHz	— Less than 50 n/s
for Grade 2 and 3 equipment from 0.1 to 4.43 MHz	— Less than 80 n/s

7.2.9.2 Recommendations for modulators (*see* Annex F).

For method of measurement (*see* Annex H).

7.2.10 *Luminance Non-linearity*

Recommendations for standard B/G are as follows:

Grade 1	3%
Grade 2	3%
Grade 3	5%

For method of measurement (*see* Annex P).

7.2.11 *2T-Pulse*

Method of measurement and recommendation (*see* Annex J).

7.2.12 *20T-Pulse*

Method of measurement and recommendation (*see* Annex K).

7.2.13 *Television Carrier-to-Noise Ratio*

Method of measurement and recommendation (*see* Annex L).

The measured value shall be stated together with the defined bandwidth.

7.2.14 *Signal-to-Noise Ratio (TV)*

Video signal-to-noise ratio shall be measured as given in **5** of IS 4545 (Part 5) : 1983. Recommendations for headend output for standard B/G are as follows:

Grade 1	57 dB
Grade 2	52 dB
Grade 3	48 dB

7.2.15 *Phase Noise*

Under consideration.

7.2.16 *Audio in TV*

Specify on the data sheets if the audio input is balanced or unbalanced. It is recommended to use a balanced input and connector. [*see* IS 11777 (Part 9) (*under revision*)] (Annex M).

7.3 Indoor-FM Radio

7.3.1 Specify on the data sheets if the audio input is balanced or unbalanced. It is recommended to use a balanced input and connector as per IS 11777 (*first revision*) (*under preparation*) (Annex M).

7.3.2 *Crosstalk, Stereo*

It is recommended that the crosstalk suppression of the stereo channels shall be better than 30 dB in the frequency range 200....10 000 Hz. State, together with the test frequencies, the values at which the specifications are met.

7.3.3 *Harmonic Distortion*

It is recommended that the harmonic distortion of the FM converter shall be less than 0.5% with 75 kHz deviation in the frequency range 40.....6 000 Hz. State, together with the test frequencies, the values at which the specifications are met.

7.3.4 *Intermodulation Distortion*

It is recommended that the intermodulation distortion ratio caused by the pilot frequency and the modulating sound signal shall be 40 dB or more, when the modulation frequency is 10 000 Hz with 75 kHz deviation and equal left and right polarized signals. Reference level is 1 kHz signal level with 75 kHz deviation. State the values at which the specifications are met.

7.3.5 *Modulator Data*

Specifications for depth, deviation and group delay pre-emphasis of the data sheets shall be published.

7.4 Outdoor

7.4.1 *Antennas*

7.4.1.1 *Antenna gain*

The minimum gain of the receiving antenna at the nominal resistive load shall be specified in the data sheets with reference to the half wave dipole antenna and indicating the relevant frequency range.

7.4.1.2 *Sidelobe suppression*

Recommendation

Grade 1	>18 dB
Grade 2	>18 dB
Grade 3	>10 dB

7.4.1.3 *Return loss*

Recommendation:

Grade 1	TV channel antenna	>20 dB
	TV channel group antenna	>16 dB
	FM	> 14 dB
Grade 2	TV channel antenna	>16 dB
	TV channel group antenna	>14 dB
	FM	>14 dB
Grade 3	TV channel antenna	>14 dB
	TV channel group antenna	>10 dB
	FM	>10 dB

8 MARKING

8.1 The equipment shall be legibly marked with the following:

a) Manufacturer's name or trade-mark,

b) Serial No.,

c) Power supply requirements, and

d) Maximum admissible output voltage.

8.2 It is recommended that standard symbols should be used when working ports.

8.3 BIS Certification Marking

The equipments may also be marked with the Standard Mark.

8.3.1 The use of the Standard Mark is governed by the provisions of Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. Details of conditions under which a license for the use of the Standard Mark may be granted to the manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Table* 6)

SINGLE-CHANNEL INTERMODULATION

A-1 SPECIFICATION FOR CHANNEL AMPLIFIER/FREQUENCY CONVERTER

A-1.1 Frequencies and levels of test carriers as shown in Fig. 3 simulate a colour television transmission where f_a, f_b, and f_c respectively correspond to vision carrier, colour subcarrier and sound carrier. The most significant intermodulation products are:

$$P3_f = f_a + f_b - f_c$$

$$P3_g = f_a + f_c - f_b$$

A-1.2 The carrier levels for television systems B, G and H are given in Table 7.

Table 7 Test Signal Levels in Decibels Relative to Reference Level

Test Signal	Signal Levels in dB
(1)	(2)
Vision carrier (f_a)	-8
Colour subcarrier (f_b)	-17
Sound carrier (f_c)	-10

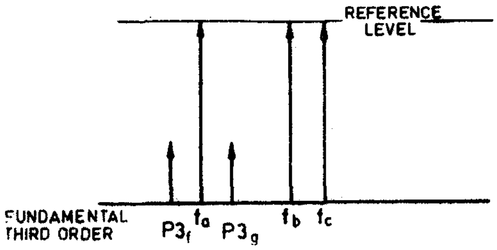


FIG. 3 TEST SIGNAL LEVELS RELATIVE TO REFERENCE LEVEL

ANNEX B

(*Table* 6)

THREE-CARRIER INTERMODULATION MEASUREMENTS

B-1 THREE-CARRIER INTERMODULATION MEASUREMENTS

B-1.1 Specifications for the measurement of three-carrier intermodulation on sub-band, full-band and multi-band amplifiers or frequency converters.

The carrier levels are given in Table 8.

Table 8 Test Signal Levels in Decibels Relative to Reference Level

Test Signal	Signal Levels in dB
(1)	(2)
Test frequency (f_1)	0
Interfering frequency (f_2)	– 6
Interfering frequency (f_3)	– 6

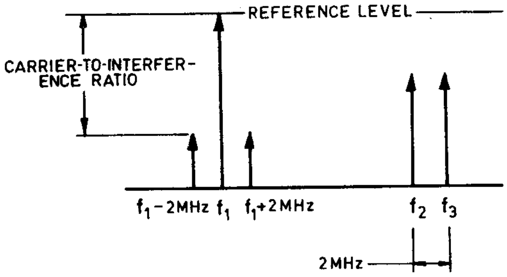


FIG. 4 TEST FREQUENCIES AND INTERFERING FREQUENCIES IN THE PASSBAND

ANNEX C

(*Table* 6)

TEST CARRIERS, LEVELS AND INTERMODULATION PRODUCTS

C-1 TWO-SIGNAL TESTS FOR SECOND AND THIRD ORDER PRODUCTS

C-1.1 Intermodulation Products with Test Signals at Frequencies f_a and f_b

Second order (*see* Note): $P2_a = f_b - f_a$

$P2_b = f_a + f_b$

Third order $P3_a = 2f_a - f_b$ where $2f_a > f_b$

$P3_a = f_b - 2f_a$ where $2f_a < f_b$

$P3_b = 2f_b - f_a$

$P3_c = 2f_a + f_b$

$P3_d = 2f_b + f_a$

NOTE — Not applicable to narrow-band equipment unless the frequency range covered by the equipment is such that $2f_{Min} < f_{Max}$.

C-1.2 Signal Levels

The two test carriers shall be set to the reference level.

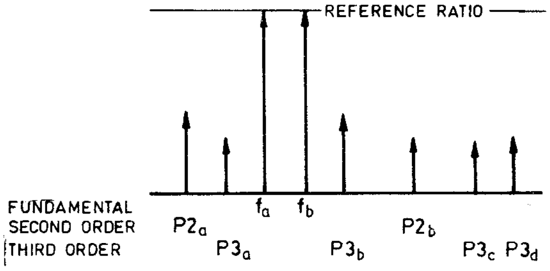


FIG. 5 AN EXAMPLE SHOWING PRODUCTS FORMED WHEN $2f_a > f_b$

NOTE — The sequence of the intermodulation products will depend on the fundamental frequency chosen.

ANNEX D

(*Table* 1)

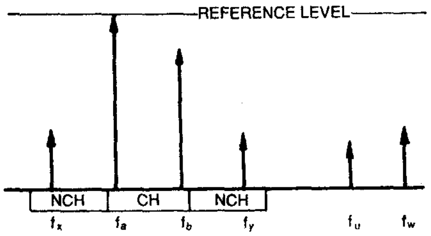
SPURIOUS SIGNALS IN OUTPUT

D-1 SPURIOUS SIGNALS IN OUTPUT, IN CHANNEL 40....862 MHz

D-1.1 The carrier levels for system B/G are given in Table 9.

Table 9 Test Signal Levels in Decibels Relative to Reference Level

Test Signal	Signal Level in Decibels
(1)	(2)
Vision carrier (f_a)	0
Sound carrier (f_b)	−10



$f_x = 2f_a - f_b$; $f_y = 2f_b - f_a$

f_u, f_w are examples for all other spurious outputs

FIG. 6 TEST SIGNAL LEVELS RELATIVE TO REFERENCE LEVEL

NOTE — If for channel processing the difference between the intermodulation products f_x and f_y to the reference level is less than 60 dB, the device should be marked with the note: 'NOT SUITABLE FOR ADJACENT CHANNEL OPERATION'.

ANNEX E

(*Clause* 7.2.5.1 *and Table* 1)

DEFINITION OF THE SPECIFIED TEST RANGE FOR RETURN LOSS AND NOISE FIGURE

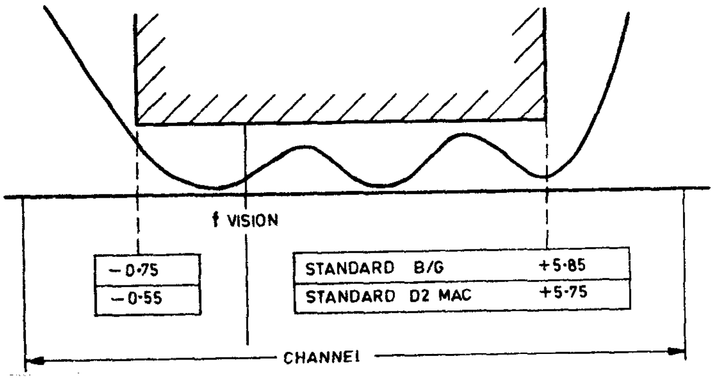


FIG. 7 TV CHANNEL PROCESSOR

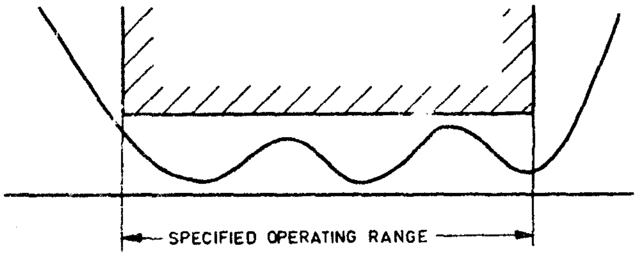


FIG. 8 SUB-BAND, FULL BAND, MULTIBAND AMPLIFIER

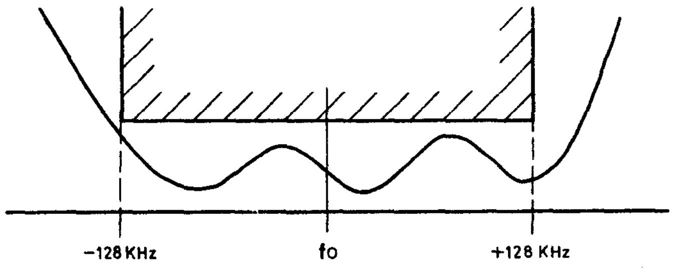


FIG. 9 FM-RADIO CHANNEL PROCESSOR

ANNEX F

(Clauses 7.2.3 *and* 7.2.9.2)

SELECTIVITY DIAGRAM FOR ADJACENT CHANNEL TRANSMISSION

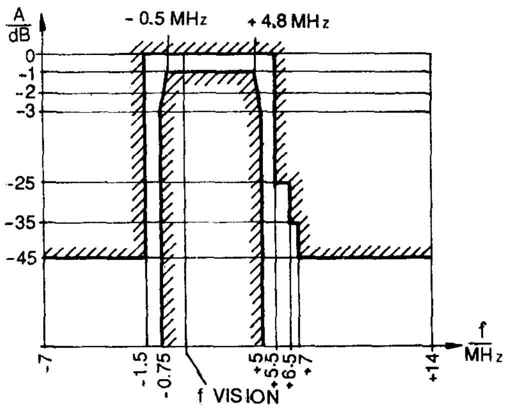


FIG. 10 STANDARD PAL B/G TV MODULATOR WITH MONO SOUND

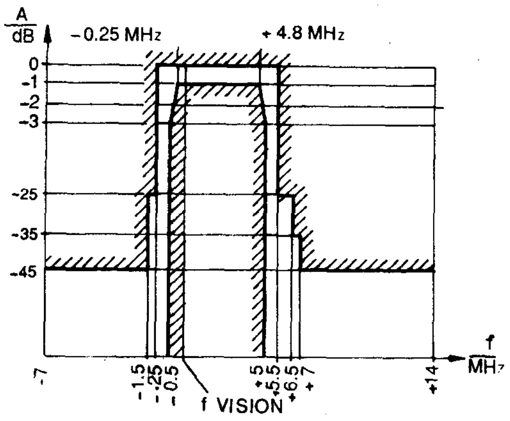


FIG. 11 STANDARD B/G TV MODULATOR WITH NICAM 728

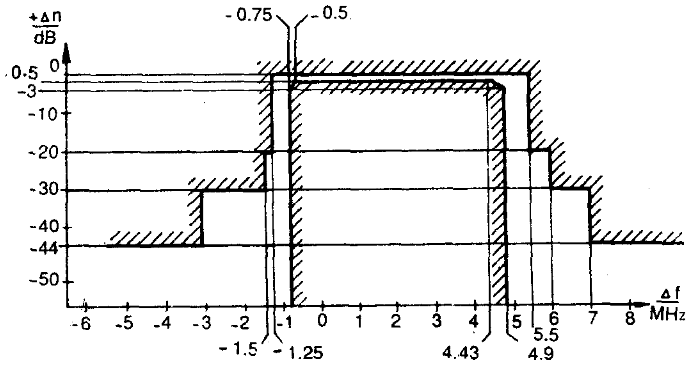


FIG. 12 STANDARD PAL B/G TV MODULATOR FOR DUAL SOUND/STEREO

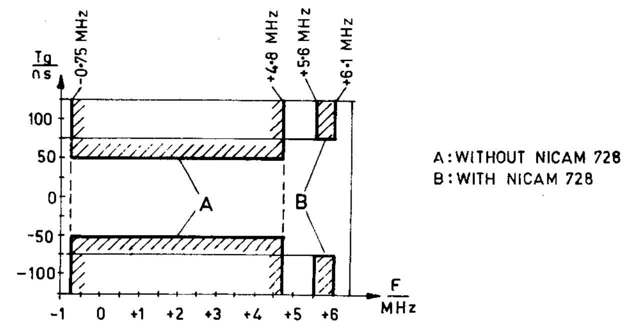


FIG. 13 GROUP DELAY

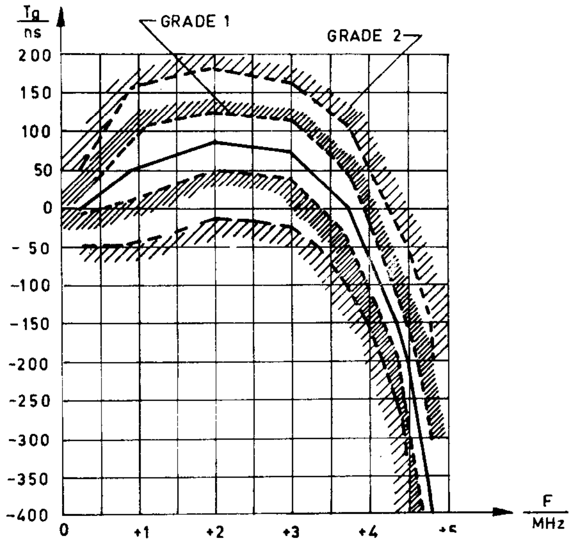
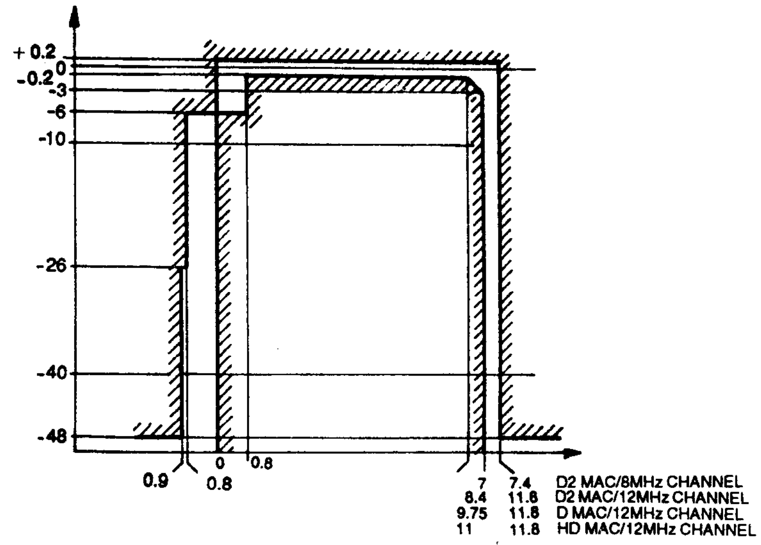


FIG. 14 GROUP DELAY PRECORRECTION STANDARD B/G TV MODULATOR



Within the range of the Nyquist slope, the sum of the upper and lower side band amplitudes shall also meet the given parameter tolerance of ±0.2 dB.

FIG. 15 STANDARD MAC TV MODULATOR

ANNEX G

(*Clauses* 7.2.8.1 *and* 7.2.8.2)

DIFFERENTIAL GAIN AND PHASE

G-1 INTRODUCTION

G-1.1 The methods described are applicable to the measurement of differential gain and differential phase for complete systems and items of equipment thereof. The test signals employed are in both cases those recommended in CCIR Recommendation 567 (1978).

G-1.2 It is intended that these measurements be carried out with test signals inserted at the system headend. They may be either of the full field type or, where convenient, may be inserted in the field blanking period.

G-1.3 The use of frame inserted test signals available on the broadcast TV channels is not generally recommended as these are subject to variations beyond the control of the user. However, where such signals of known stability and of adequate quality are available, they may be used to carry out these measurements.

G-2 DIFFERENTIAL GAIN

G-2.1 Differential gain is expressed by two values : $x\%$ and $y\%$ which represent the two peak amplitudes of the sub-carrier relative to the amplitude of the sub-carrier at blanking level. In the case of a monotonic characteristic, either x or y will be zero.

Differential gain, in percentage referred to blanking level, can be found from the expressions below:

$$x = 100 \left| \frac{A_{\text{Max}}}{A_0} \right| - 1 \text{ and } y = 100 \left| \frac{A_{\text{Min}}}{A_0} \right| - 1$$

Peak-to-peak differential gain can be found from the expression:

$$x + y = 100 \left| \frac{A_{\text{Max}} - A_{\text{Min}}}{A_0} \right|$$

where

A_0 = amplitude of the received sub-carrier at blanking level, and

A = amplitude of the sub-carrier on one of the other treads of the staircase.

G-2.2 Equipment Required

The test set-up shall be well-matched.

G-2.2.1 An oscilloscope which will not contribute significant distortion to the signal displayed.

G-2.2.2 A modulator (unless transmitted test signals in the field blanking interval are to be used) having the following characteristics:

a) Radio-frequency characteristics (excluding sound) and appropriate to the television transmission system used;

b) Video signal input requirement of 1V peak-to-peak composite; and

c) A modulated output signal of a convenient amplitude.

G-2.2.3 A demodulator having characteristics appropriate to the television transmission system used.

G-2.2.4 Two attenuators variable in steps of not more than 1 dB.

G-2.2.5 A band-pass filter having f_0 equal to the chrominance sub-carrier frequency and a bandwidth of 0.5 MHz.

For colour systems, f_0 = 4.43 MHz

G-2.2.6 A test signal generator (unless transmitted test signals are used) providing signals having characteristics appropriate to the television transmission system.

NOTE — Most commercially available test signal generators will provide this signal as part of a composite test line.

G-2.3 Connection of the Equipment

The equipment shall be connected as in Fig. 16.

G-2.4 Measurement Procedure

G-2.4.1 With point A directly connected to point B (*see* Fig. 16) adjust attenuator A_1 for an output level sufficient to drive the system to be tested and attenuator A_2 to obtain the correct input level to the demodulator.

G-2.4.2 Insert the appropriate band-pass filter after the demodulator (*see* Fig. 16) and measure the differential gain by examining the modified staircase waveform.

G-2.4.3 Ensure that the distortion of the test signal caused by the control loop (test equipment) is small compared with the maximum distortion allowed for the system or equipment to be tested.

NOTE — Where the linearity of the modulator/demodulator is such that on systems B and G (10 percent residual carrier) this requirement cannot be met, it will be necessary either to reduce the sub-carrier amplitude or to ignore the sixth (uppermost) tread.

G-2.4.4 Connect the system or equipment to be tested between points A and B and disconnect the band-pass filter. Adjust attenuator A_2 to return the input level to the demodulator to that used in the procedure of **G-2.4.1** above.

G-2.4.5 Reinsert the band-pass filter and measure the maximum differential gain by examining the modified staircase waveform.

G-3 DIFFERENTIAL PHASE

G-3.1 Definition

Differential phase is expressed by two values $x\%$ and $y\%$ in degrees, which represent the two peak phases of the sub-carrier relative to the phase of the sub-carrier at blanking level. In the case of a monotonic characteristic, both x and y will be zero.

Differential phase, in degrees, referred to blanking level, can be found from the expressions below:

$$x = |\phi_{Max} - \phi_0| \text{ and } y = |\phi_{Min} - \phi_0|$$

Peak-to-peak differential phase can be found from the expression:

$$x + y = |\phi_{Max} - \phi_{Min}|$$

where

ϕ_0 = phase of the received sub-carrier at blanking level, and

ϕ = phase of the sub-carrier on one of the other treads of the staircase.

G-3.2 Equipment Required

G-3.2.1 A modulator (unless transmitted test signals in the field blanking interval are to be used) having the following characteristics:

a) Radio-frequency characteristics (excluding sound);

b) Video signal input requirement of 1 V peak-to-peak composite; and

c) A modulated output signal of a convenient amplitude.

G-3.2.2 A demodulator having characteristics appropriate to the television transmission system used.

G-3.2.3 Two attenuators variable in steps of not more than 1 dB.

G-3.2.4 A test set capable of measuring the difference in phase of the sub-carrier at each tread of the staircase, compared with that at the reference (black) level.

G-3.2.5 A test waveform generator (unless transmitted test signals in the field blanking intervals are to be used) providing signals having characteristics appropriate to the television transmission system.

NOTE — Certain types of test sets (*see* G-3.2.4) require the presence of a colour burst during the back porch period of the test signal.

G-3.3 Connection of the Equipment

The equipment shall be connected as in Fig. 16.

G-3.4 Measurement Procedure

G-3.4.1 With point A directly connected to point B (*see* Fig. 16), adjust attenuator A for an output level sufficient to drive the system to be tested and attenuator A to obtain the correct input level to the demodulator. Connect the differential phase test set.

G-3.4.2 Ensure that the distortion of the test signal due to the control loop (test equipment) is small compared with the maximum distortion allowed for the system or equipment to be tested (*see also* Note of **G-2.4.3**).

G-3.4.3 Connect the system or equipment to be tested between points A and B. Adjust attenuator A to return the input level to the demodulator to that used in **G-3.4.1** above.

G-3.4.4 Determine the relative sub-carrier phases corresponding to the six treads of the staircase waveform. The differential phase of the system or equipment under test is the maximum phase change between the blanking level tread and that of any other tread of the staircase.

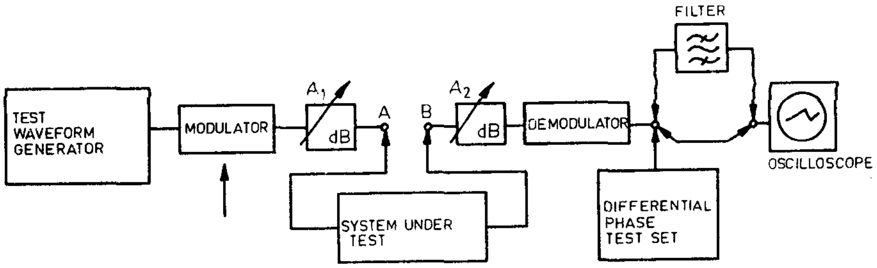


FIG. 16 ARRANGEMENT OF TEST EQUIPMENT FOR MEASUREMENT OF DIFFERENTIAL GAIN AND PHASE

ANNEX H

(*Clause* 7.2.9.2)

METHOD OF MEASUREMENT FOR GROUP DELAY VARIATION

H-1 GROUP DELAY VARIATION

H-1.1 By the group delay variation (within the video band 25 Hz -50 MHz) is understood the deviation from the linear phase-frequency response. This deviation is measured as the difference between the slope of the phase-frequency response at a given frequency and the slope at the reference frequency, 200 kHz.

H-1.2 Method of Measurement

H-1.2.1 The complete measuring set-up (apart from the TV modulator and demodulator) is available as a commercial measuring instrument (dotted line).

H-1.2.2 The output signal from the video generator/AM modulator is a carrier which is amplitude-modulated with a 20 kHz signal. Sync pulses are added to the signal and it is sent through the TV modulator to the item under test. After demodulation, the signal is passed to a phase detector where the *n*-phase shift of the test tone in relation to the modulation signal is measured.

H-1.2.3 The phase shift is expressed as group delay by means of the formula:

$$t = \phi_e/(360 f_m) \text{ sec}$$

where

ϕ_e = phase difference in degrees,

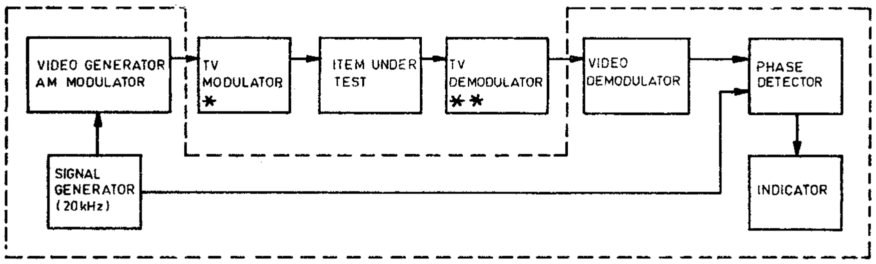
f_m = frequency of test signal = 20 000 Hz, and

t = group delay in seconds.

H-1.2.4 The TV modulator is set to the vision carrier of the TV channel. The measuring level shall be the nominal input level of the test item as prescribed by the manufacturer.

H-1.2.5 The TV demodulator is set to reception of the selected TV channel. The frequency of the AM modulator is varied within the range 0.1 to 4.43 MHz, and the measurement is repeated so that the group delay is expressed as a function of the frequency within the video band for the test item.

H-1.2.6 The group delay variation is determined by using the formula above, or is read directly on the commercial measuring instrument.



* For TV modulator measurements, remove TV modulator and connect video generator directly to the device to be tested.

** For TV demodulator measurements, remove TV demodulator and connect the device to be tested directly to the video demodulator.

FIG. 17 MEASURING SET-UP FOR DETERMINING THE GROUP DELAY VARIATION

ANNEX J

(*Clause* 7.2.11)

2 T-PULSE RESPONSE

J-1 2T-PULSE MEASURING METHOD

J-1.1 A test waveform generator providing a sine-squared pulse of half amplitude duration equal to $2T$, where T is the periodic time appropriate to the TV system under consideration. For 625-line systems T = 100 ns and for 525-line systems T = 125 ns. The test signals are in accordance with CCIR Recommendation 567 (1978).

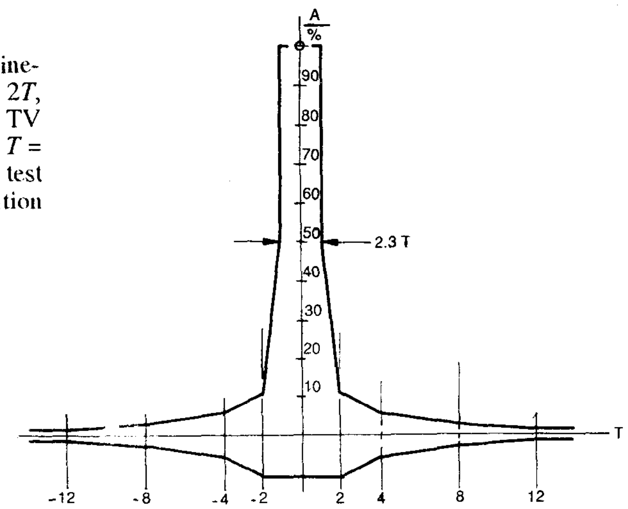


FIG. 18 K– FACTOR MASK

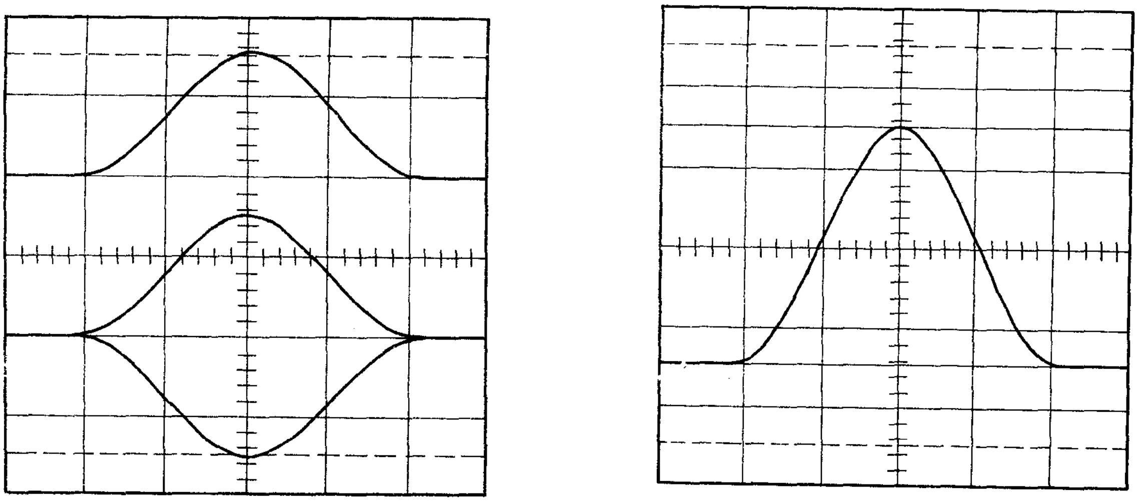
ANNEX K

(*Clause* 7.2.12)

20 T-PULSE RESPONSE

K-1 20T-PULSE MEASURING METHOD

K-1.1 The 20T-pulse has a half amplitude duration of 2μS. It develops from a chrominance sub-carrier which is first modulated with a sin^2 signal and then superimposed with the same signal as used for modulation (Fig. 19). It has two spectrum ranges of the same bandwidth and the same amplitude in the luminance and chrominance ranges. Due to its pulse spectrum the



19.1 Luminance Frequency Portion and Chrominance Sub-carrier Pulse

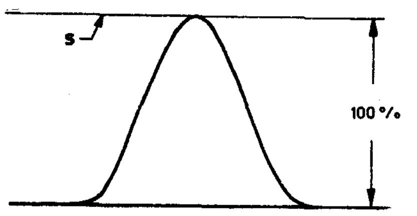
19.2 20T-Pulse

FIG. 19 MODULATED 20T-PULSE COMPOSED FROM THE LUMINANCE FREQUENCY PORTION AND THE CHROMINANCE SUB-CARRIER PULSE BY IN-PHASE AND CORRECT AMPLITUDE ADDITION

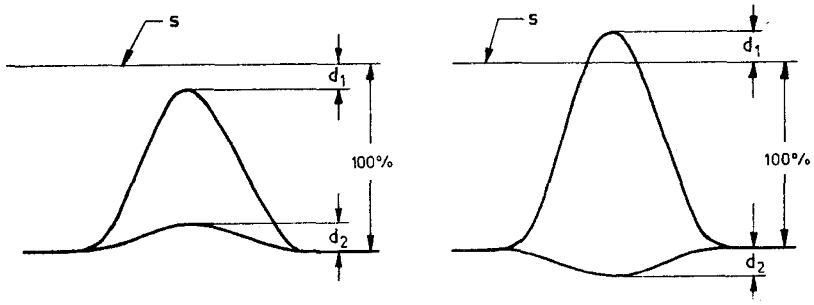
20T-pulse is particularly suitable for testing colour TV systems. Its ground distortion is used to detect amplitude and delay time errors in the chrominance sub-carrier range. Amplitude-only errors cause a symmetric ground distortion and a variation of the pulse amplitude. Delay-time-only errors cause an unsymmetric ground distortion and no variations of the pulse amplitude.

K-1.2 Only synchronous demodulation should be used.

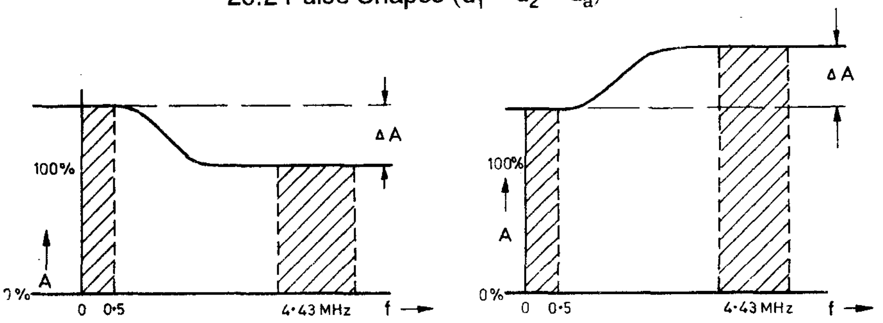
K-2 Figure 20 gives the pulse deformation caused by amplitude and delay time errors as well as how to determine the magnitude of the errors.



20.1 Undistorted 20T-Pulse (S Pulse Top of Step Function Signal)

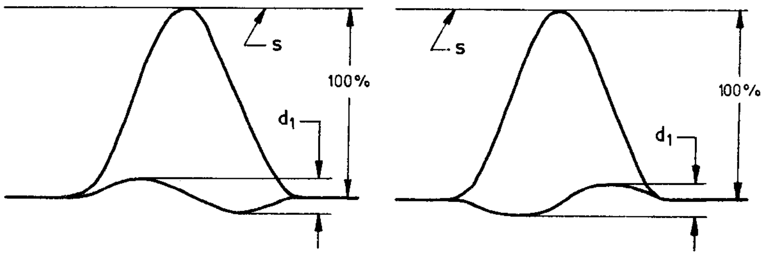


20.2 Pulse Shapes ($d_1 = d_2 = d_a$)

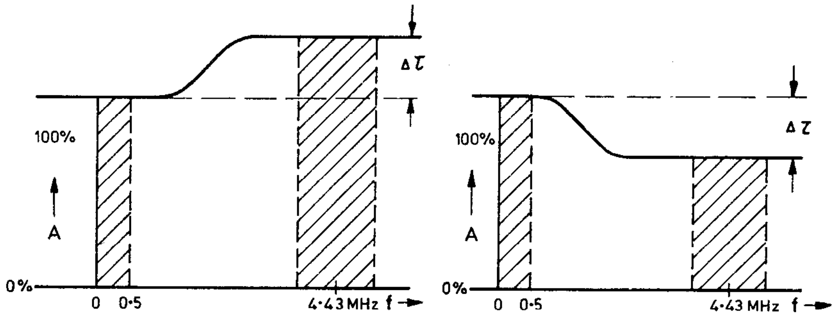


20.3 Frequency Response of Amplitude ΔA

Fig. 20 Distortion of the Modulated 20T-Pulse for Amplitude — Only Errors



21.1 Pulse Shapes



21.2 Frequency Response of Delay Time Δ τ

FIG. 21 DISTORTION OF THE MODULATED 20T-PULSE FOR DELAY TIME— ONLY ERRORS

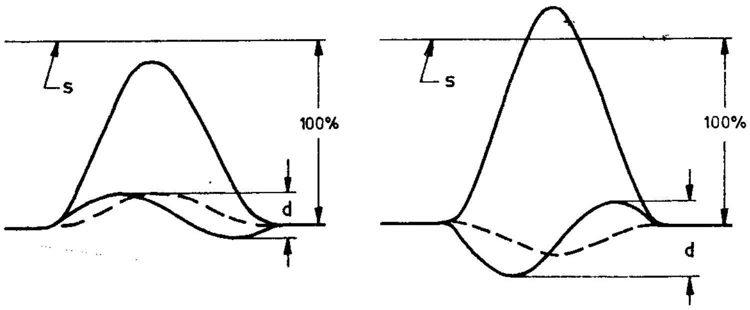


FIG. 22 MIXED AMPLITUDE AND DELAY TIME ERRORS DASHED PORTION FOR AMPLITUDE— ONLY ERRORS (d IS NOT A LINEAR ADDITION OF d_a AND d_1)

ANNEX L

(*Clause* 7.2.13)

METHOD OF MEASUREMENT AND RECOMMENDATION FOR TELEVISION CARRIER TO NOISE RATIO

L-1 TELEVISION CARRIER-TO-NOISE RATIO

L-1.1 Introduction

L-1.1.1 The method described is applicable to the measurement of the carrier to random noise ratio within a television channel at a specified point within a cabled distribution system. The method of measurement actually determines carrier (plus noise) to noise ratio; however, the difference between this and the carrier to noise ratio is very small if the value exceeds 20 dB.

The method assumes that the random noise is evenly distributed within the channel.

L-1.2 Equipment Required

L-1.2.1 A selective voltmeter with a known noise bandwidth less than that of the channel to be measured.

L-1.2.2 A c.w. signal generator covering the frequencies at which the tests are to be carried out.

L-1.2.3 A variable attenuator with a range greater than the carrier to noise ratio expected.

L-1.2.4 *A Shielded Terminating Resistor*

NOTE — Additional items may be necessary, for example, to ensure correct calibration and operation of the test equipment (*see* Annex N).

L-1.3 Connection of Equipment

The equipment shall be connected as in Fig. 23.

L-1.4 Measurement Procedure

L-1.4.1 *General*

L-1.4.2 The test set-up shall be well-matched and sensitivity of the measuring equipment (*see* **N-3**) shall be known over the frequency range of the channel to be measured.

L-1.4.3 Where the system to be measured includes:

a) automatic gain control (AGC) tests should be carried out at minimum and maximum levels of signal input;

b) automatic level control (ALC), pilot signals of the correct type, frequency and level shall be maintained throughout the tests.

L-1.4.4 The selective voltmeter shall be calibrated and checked for satisfactory operation as follows.

L-1.4.5 *Calibration*

- Level correction, average/rms or peak/rms (*see* **N-2**)
- Noise bandwidth (*see* **N-4**)

L-1.4.6 *Other Checks*

- Sensitivity (*see* Annex N).
- Noise (*see* **N-3**)
- Intermodulation (*see* **N-3**)
- Overload (*see* **N-3**)

L-1.5 Measurement

L-1.5.1 Set the signal generator to the vision carrier frequency of the channel to be tested and adjust its output and those of the different points of the system as far as the point of measurement, to obtain the specified system operating levels throughout.

L-1.5.2 Connect the variable and selective voltmeter to the point of measurement. Tune the voltmeter to the reference signal and note the attenuator value a, required to obtain a convenient voltmeter reading R. The attenuator value a, should be slightly greater than the signal-to-noise ratio expected at the point of measurement.

L-1.5.3 Disconnect the generator and replace it by the shielded terminating resistor, or, if the reference signal is used for AGC, retune the voltmeter within the channel such that it is influenced only by random noise. Reduce the attenuator setting to the value a_2 required to again obtain the same voltmeter reading R.

L-1.5.4 The carrier to noise ratio in decibels is given by:

$$C/N = a_1 - a_2 - C_m - C_b$$

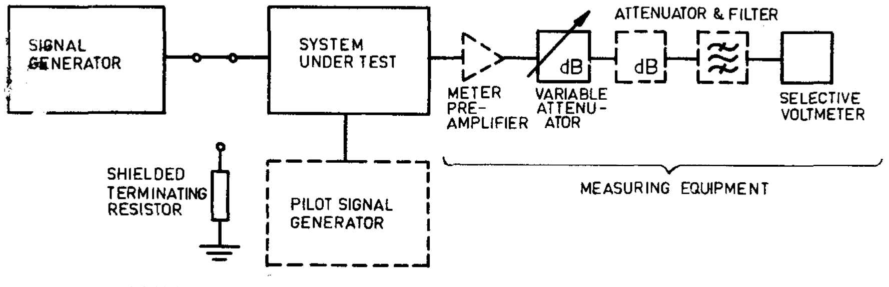
where

a_1 = attenuator value for the reference signal,

a_2 = attenuator value for the noise,

C_m = voltmeter level correction factor (*see* **N-2**), and

C_b = bandwidth correction factor (*see* N-2).



NOTE — Dotted lines signify additional items which may be required.

Fig. 23 Arrangement of Test Equipment for Carrier-to-Noise Ratio Measurement

ANNEX M

(*Clauses* 7.2.16 *and* 7.3.1)

AUDIO CONNECTOR

M-1 MECHANICAL DIMENSIONS

M-1.1 The mechanical details of audio connectors are given in Table 10.

Table 10 Mechanical Dimensions

Reference	mm	
	Max	*Min*
(1)	(2)	(3)
φa	1.5	1.46
b	8.5	7.5
c	9.3	8.8
φd	7.05	6.95
φe	12.4	12.1
φf	13.6	13.1
g	1	–
h	9	8.5
j	2.4	2.2
k	4.9	4.55
φl	16.5	–
φm	18	–
o	–	15
p	0.75	0.65

Table 11 Pin Configuration

Pin	Signal
(1)	(2)
1	Audio L/Mono 1
2	Screen
3	Audio R/Mono 2
4	Audio L/Mono 1
5	Audio R/Mono 2
6	Line, Contact 1
7	Line, Contact 2
8	Common line

Table 12 For Dual Sound or Stereo/Mono Application

Application	Pin 6 – 8	Pin 7 – 8
(1)	(2)	(3)
Mono	open	close
stereo	close	open
dual sound	open or close	open close

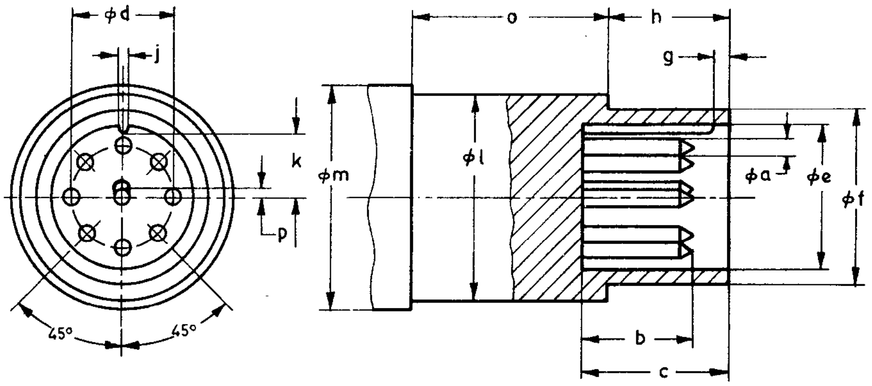


FIG. 24 MECHANICAL DIMENSIONS

ANNEX N

(*Clause* L-1.2.4)

EQUIPMENT REQUIRED — ADDITIONAL ITEMS

N-1 EQUIPMENT REQUIRED - ADDITIONAL ITEMS

N-1.1 Voltmeter Preamplifier

If the sensitivity of the selective voltmeter is not adequate for the levels of noise expected at the point of measurement, a suitable preamplifier of the correct input impedance and sensibly flat response over the channel to be measured will be necessary. This preamplifier should be included as part of the measuring equipment when making the checks described in N-3.

N-1.2 Voltmeter Input Filter

If the selectivity of the selective voltmeter is not adequate to reduce to an insignificant level the effect of 'out-of-channel' signals on the measurement of the noise voltage, a suitable filter having a sensibly flat response over the channel to be measured will be required as shown in Fig. 23.

In this case, it is important that the matching between the filter and the preceding equipment shall be such that it results in a return loss ratio of not less than 20 dB within the frequency range of the channel to be measured, and that the whole measuring equipment shall satisfy all the requirements of G-3.

Where this is in doubt, an attenuator of sufficient value to satisfy this requirement should be included as shown in Fig. 23.

N-2 CORRECTION FACTORS

N-2.1 Level Correction Factor C_m

If a selective voltmeter responding to the average value of the applied voltage but calibrated in rms values (assuming a sinusoidal input signal) is employed, it will indicate a level approximately 1 dB below the rms value of the applied noise voltage in its noise bandwidth. In this instance C_m may be taken as 1 dB.

If a selective voltmeter of the peak reading type is used, a correction appropriate to the particular instrument shall be employed as C_m.

N-2.2 Bandwidth Correction Factor C_b

This correction factor takes into account the difference between the noise bandwidth of the selective voltmeter B_m and that of the appropriate television system B_{TV}.

$$C_b = 10 \log \frac{B_{TV}}{B_m} (dB)$$

The noise bandwidth B_{TV} for television system B, C, G, and H is 4.75 MHz.

N-3 PRELIMINARY CHECKS ON THE MEASURING EQUIPMENT FOR CARRIER-TO-NOISE RATIO

N-3.1 Noise

With the input to the measuring equipment terminated and the variable attenuatior set to zero, tune the voltmeter over the frequency range of interest and check that the reading remains negligible relative to that expected when measuring the system noise.

N-3.2 Intermodulation

Connect signals, corresponding to those which will be present at the point of measurement, via a matched directional coupler, to the measuring equipment. Tune the meter to any significant intermodulation products and note the lowest value of the signal/intermodulation ratio within the channel being considered. This ratio should exceed the minimum carrier/noise ratio expected at the point of measurement by an amount relevant to the accuracy desired. For example, 20 dB would result in an error of less than 1 dB.

If this requirement is not met, an appropriate channel pass-band filter to attenuate one of the signals should be included as indicated in Fig. 23, and the checks of N-3.1 and N-3.2 should be repeated.

NOTE – This check relating to intermodulation is necessary only if automatic level control (ALC) pilot signals or other signals are present during the carrier to noise ratio tests.

N-3.3 Overload

Connect signals as in N-3.2 and attenuate one of them to a level comparable with that of the noise voltage expected at the point of measurement. Tune the meter to the low level signal. Tune the low level signal and the meter in step over the frequency range of the channel to be measured and check that the meter reading does not change when the high level signals are switched off and on.

If this requirement is not met, a filter to attenuate one or more of the signals should be included as indicated in Fig. 23 and all the above checks should be repeated as mentioned in N-3.2.

N-4 CALIBRATION OF THE SELECTIVE VOLTMETER

N-4.1 Noise Bandwidth (B_m)

A well-matched noise generator is required, having a known bandwidth B_g (*see* Note 1), and an output voltage of known rms value V_g sufficient to give a convenient reading on the voltmeter.

The voltmeter is connected to the noise generator (*see* Note 2) and tuned to a test frequency. The tune rms voltage V_m is measured. This procedure is repeated at each test frequency.

The noise bandwidth of the voltmeter (B_m) is given by:

$$B_m = B_g\,(V_m/V_g)^2$$

where

B_m and B_g are in the same units, for example, megahertz, and V_m and V_g are in the same units.

NOTES

1 B_g will usually be taken as 1 MHz and V_g is calculated for this bandwidth from information provided by the manufacturer of the noise generator.

2 The noise generator may consist of a noise diode source followed by an appropriate amplifier.

ANNEX P

(*Clause* 7.2.10)

METHOD OF MEASUREMENT OF LUMINANCE NON-LINEARITY

P-1 LUMINANCE NON-LINEARITY

P-1.1 Luminance non-linearity (LUM NL) describes the changing gain for different output levels. It is defined by the linearity figure (minimum to maximum slope of the output characteristic).

P-1.2 The easiest way to determine it is to use the staircase signal. The different step heights in the output signal which originally were of equal height in the input signal — form the figure for the static linearity. In order to measure the output signal, it is differentiated. Each step transition generates voltage peaks which are a measure for the step height.

$$\text{LUM NL} = \frac{A_{\text{Min}}}{A_{\text{Max}}}$$

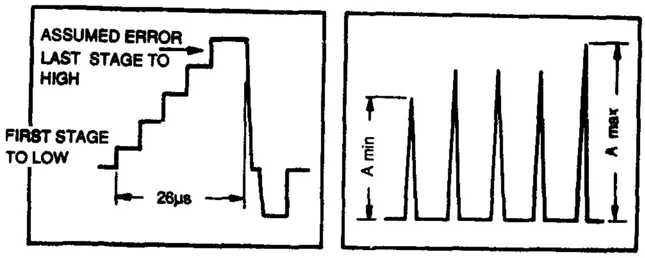


FIG. 25 MEASUREMENT OF LUMINANCE NON-LINEARITY STAIRCASE SIGNAL AND STAIRCASE SIGNAL AFTER DIFFERENTIATION

ANNEX Q

(*Clause* 2.1)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
4545 (Part 5) : 1983	Methods of measurement on receivers for television broadcast transmissions : Part 5 Sensitivity (*first revision*)
9000	Basic environmental testing procedures for electronic and electrical items:
(Part 1) : 1988	Part 1 General (*first revision*)
(Part 2/Sec 1 to 4) : 1977	Part 2 Cold test, Section 1 General Section 2 Cold test for non-heat dissipating items with sudden change of temperature Section 3 Cold test for non-heat dissipating items with gradual change of temperature Section 4 Cold test for heat dissipating items with gradual change of temperature
(Part 3/Sec 1 to 5) : 1977	Part 3 Dry heat test, Section 1 General Section 2 Dry heat test for non-heat dissipating items with sudden change of temperature Section 3 Dry heat test for non-heat dissipating items with gradual change of temperature Section 4 Dry heat test for heat dissipating items with sudden change of temperature Section 5 Dry heat test for heat dissipating items with gradual change of temperature
(Part 5/Sec 1 and 2) : 1981	Part 5 Damp heat (cyclic) test, Section 1 16 + 8 h cycle Section 2 12 + 12 h cycle
(Part 7/Sec 1 to 4) : 1979	Part 7 Impact tests, Section 1 Shock Section 2 Bump Section 3 Drop and topple Section 4 Free fall
(Part 8) : 1981	Part 8 Vibration (sinusoidal) test
(Part 31) : 1978	Part 31 Combined cold/low air pressure tests
9001	Guidance for environmental testing:
(Part 14) : 1979	Part 14 Storage tests
14231	Cabled distribution system for television and sound signals:
(Part 1) : 1995	Part 1 Safety requirements
(Part 2)	Part 2 Electromagnetic compatibility for components and systems (*under preparation*)
(Part 3) : 1995	Part 3 Active coaxial wide band distribution components
11777 (Part 9)	Connectors for frequency below 3 MHz : Part 9 Circular connectors for radio and associated sound equipment (*under preparation*)
Doc: LTD16 (1753)	Radio frequency connectors : Part 8 R.F. Coaxial with inner diameter of outer conductor 6.5 mm (0.256 in) with bayonet lock characteristics impedance 50 ohms (Type BNC) (*under preparation*)
Doc : LTD 16 (1754)	Radio frequency connectors : Part 2 Coaxial matched television aerial feeder connector (*under preparation*)

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Amendments Issued Since Publication

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